REMARKS

Claims 1, 5, 7, 11, 13, 16, 21, 23, and 27 have been amended. No new claims have been added. Claims 6, 15, 17-20, and 22 have been cancelled. Accordingly claims 1-5, 7-14, 16, and 23-28 remain under prosecution in this application.

35 USC § 102

Claims 1-5, 10, 12, 13, 17-21, 26, and 28 are rejected under 35 USC § 102(b) as being anticipated by Itoga. Claim 1 has been amended to require that the obtaining of a defect image of the sample is done by collecting infrared light irradiated from said sample. Itoga does not disclose the use of infrared radiation, but rather, performs a measurement of the sample surface size and shape (more specifically the transducer position and attitude) using cameras viewing an ultrasonic transducer with attached LED's, or in the alternative, Itoga teaches using a mechanical drawing of the sample. He then correlates the data generated from the ultrasonic transducer with the position of the transducer, as deduced from either the drawing or the video measurement of the surface coordinates. No use of infrared light is taught or suggested by Itoga, and accordingly the rejection of claim 1 is believed to be overcome.

Claim 5 has been amended to incorporate the features of claim 6. None of the references of record teach or suggest the invention set forth in newly amended claim 5 and accordingly the undersigned believes that claim 5 and its dependent claims are now in condition for allowance.

Claim 13 has been amended to incorporate the features of claim 15. None of the references of record teach or suggest the invention set forth in amended claim 13 and accordingly the undersigned believes that claim 13 and its dependent claims are now in condition for allowance.

Claim 21 has been amended to incorporate the features of claim 22. None of the references of record teach or suggest the invention set forth in newly amended claim 21 and accordingly the undersigned believes that claim 21 and its dependent claims are now in condition for allowance.

Further Discussion of Itoga

The claimed invention differs from Itoga in at least one significant aspect. Specifically, Itoga is concerned about measuring a **sample surface size and shape**. That is why there is so much discussion in Itoga regarding "the exact data on the shape of the object…" (see column 7, lines 32 et sec.). And this is also why the ultrasonic defect testing data is corrected for the shape measurement data of the object under test (see column 8, lines 34 et sec.). In contrast, the present invention does not rely on or need any a priory knowledge of the shape or dimension of the sample surface. In fact, the present invention is able to work in an entirely blind manner wherein the shape of the sample is never "learned."

The present invention is compensating for a very different phenomenon than that of Itoga. In Itoga, the ultrasonic transducer face is, by necessity, parallel to the sample surface (this is fundamental to ultrasonic testing). The problem Itoga is addressing is that for a curved surface, the angular attitude of the ultrasonic probe follows the surface curvature, which, in turn, generates data which is two-dimensional in nature (i.e. there is a mismatch between the shape of the part and the ultrasonic result). In the case of a flat sample, no such problem exists and conventional ultrasonic testing equipment works perfectly well because the typical automated/robotic system is capable of knowing the exact (x-y) position of the transducer for each point in the final image.

However, in the infrared case, no such one-to-one correspondence between an infrared camera pixel and a point on the sample surface exists, particularly if there are no distinguishing marks on the surface. Furthermore, if the sample is curved, some radiation from the sample is not emitted along the optical axis (i.e. toward the infrared camera), so the infrared image may be distorted (in the ultrasonic transducer image, a one-inch square patch anywhere on the sample surface will have the same number of scan points regardless of its orientation while in the infrared image, that patch will have fewer pixels than if it were located in an area where the surface normal along the optical axis of the infrared camera).

The problem associated with infrared image capturing is exacerbated by the inherent barrel distortion that infrared lenses contribute (much more severe than visible lenses, which are

more or less flat). It is possible to overcome some of these problems by using a combination of anamorphic (to remove the lens distortion) and a combination of a robotic positioning system for the infrared imaging apparatus and a positional marker similar to the three-lead marker used by Itoga. However, the very point of the present invention is that it is possible to bypass these complex and cumbersome steps by using a very simple process if the exact dimensional measurement of the sample is not needed. Thus, it is the simplicity of the present invention which allows us to use infrared radiation in the claimed manner, to generate defect images without including the complexity of the Itoga approach.

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Respectfully submitted,

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